

REMARKS

In the present Amendment, Claims 1, 11 and 12 have been amended to recite that “at least one of the photo-conductive organic semiconductor and the electroluminescent organic semiconductor is a polymer semiconductor having a conjugation in the main chain.” Support for the amendment is found, for example, at page 21, lines 7-10 of the specification. No new matter has been added, and entry of the Amendment is respectfully requested.

Claims 1-12 are pending.

In paragraph 3 of the Action, Claims 1, 11 and 12 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee et al. (US 6,930,658, “Lee”) in view of Okabe (US 5,555,205).

Applicants submit that this rejection should be withdrawn because Lee and Okabe do not disclose or render obvious the present claimed invention, either alone or in combination.

Present Claim 1 as amended relates to an organic light-light conversion device comprising:

a light sensing unit having a layer including a photoconductive organic semiconductor that causes a photo-current multiplication phenomenon by light irradiation, and

a light emitting unit having a layer including an electroluminescent organic semiconductor that emits light by current injection,

characterized in that at least one of the photo-conductive organic semiconductor and the electroluminescent organic semiconductor is a polymer semiconductor having a conjugation in the main chain.

Independent Claims 11 and 12 also have the above characteristics.

The object of the present invention is to provide an organic light-light conversion device that excels in device characteristics.

Lee is cited as teaching a contrast-adjustable display via an organic light-emitting device 1 including a light detectable unit 12 having an organic light-emitting layer 122, and a light emitting unit 14 having an organic light-emitting layer 142. The organic light-emitting layer may include a hole injecting layer, a hole transporting layer, a light-emitting layer and an electron transporting layer (Fig. 1A, col. 3, lines 35-66 and col. 4, lines 52-57).

However, Lee does not teach or suggest an organic light-light conversion device having a layer including a photo-conductive organic semiconductor that causes a photo-current multiplication phenomenon by light irradiation and that at least one of the photo-conductive organic semiconductor and the electroluminescent organic semiconductor is a polymer semiconductor having a conjugation in the main chain.

As disclosed at column 1, lines 55-58 of Lee, the object of Lee is to provide a contrast-adjustable panel or display via an organic light-emitting device, which is low cost and simply manufactured. Lee discloses at column 3, lines 20-29, “[w]hen the external light intensity grows higher, the value of contrast becomes smaller. Thus, the resolution of the display becomes worse. At this moment, if the brightness of the display is increased, the contrast of the display can be maintained in proper. In contrary, when the external light intensity gets weaker, the value of contrast is increased sharply. In this case, if the brightness of the display is decreased, the power loss is reduced and the image of the display would not be harsh to our eyes.” That is, Lee suggests that the contrast of the display is controlled by changing brightness depending on external light intensity. Therefore, the gist of Lee is different from that of the present invention.

Okabe is cited as teaching a system in which a photoelectric sensor having a photoconductive layer 13 is opposed to a liquid crystal recording medium for measuring the transmittance of the liquid crystal (Fig. 6, col. 7, lines 25-50 and col. 8, line 48 to col. 9, line 43). Okabe discloses, at column 1, lines 33-36, polyvinylcarbazole as a component of the photoconductive layer.

However, Okabe does not teach or suggest an organic light-light conversion device having a layer including a photo-conductive organic semiconductor that causes a photo-current multiplication phenomenon by light irradiation and that at least one of the photo-conductive organic semiconductor and the electroluminescent organic semiconductor is a polymer semiconductor having a conjugation in the main chain (polyvinylcarbazole does not have a conjugation in the main chain). Therefore, Okabe does not make up for the deficiencies of Lee.

Further, the object of Okabe is to improve properties of a liquid crystal recording device (column 3, lines 25-50). Okabe does not disclose or suggest the object of the present invention or the unexpected results provided by the present invention.

In summary, the object of the present invention is entirely different from the objects of Lee and Okabe. One skilled in the art would not have been motivated to combine the teaching of Lee with that of Okabe. Even if the teaching of Lee was combined with that of Okabe, the present invention would not have been achieved, as discussed above.

In view of the above, the present claims are not obvious and are patentable over Lee and Okabe, either alone or in combination. Reconsideration and withdrawal of the §103(a) rejection based on Lee in view of Okabe are respectfully requested.

In paragraph 4 of the Action, Claims 2-4 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee and Okabe and further in view of Daniels (US 2005/0088079).

In paragraph 5 of the Action, Claims 5-8 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee and Okabe and further in view of Igaki et al. (US 7,026,654, "Igaki").

Initially, the Examiner is respectfully requested to list Daniels (US 2005/0088079) on a Notice of References Cited, Form PTO-892.

Applicants submit that the above two rejections should be withdrawn for at least the same reasons that the previous § 103(a) rejection based on Lee and Okabe should be withdrawn, as discussed above.

Daniels is cited as teaching a device wherein the electroluminescent organic semiconductor is a polymer semiconductor ([0068]). Igaki is cited as teaching in Fig. 12 a semiconductor device comprising: a conductive layer (14) connecting the light sensing unit to the light emitting unit laid on the same substrate; a light shielding member (16) (Fig. 4; col. 4, line 55-60) provided between the light sensing unit (31) and light emitting unit (21). Daniels and Igaki do not make up for the deficiencies of Lee and Okabe.

In paragraph 7 of the Action, Claims 9 and 10 have been objected to as being dependent upon a rejected base claim, but have been indicated to be allowable if rewritten in independent form.

Applicants submit that Claims 9 and 10 are patentable in their present form because Claims 1-3, from which Claims 9 and 10 depend, are patentable over the cited references, as discussed above.

Allowance is respectfully requested. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,


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